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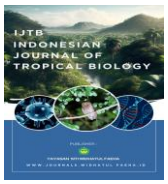

Original Research Paper

Equitable Development Strategy for Lombok Island and Sumbawa Island in West Nusa Tenggara

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Abstract

Regional inequality between Lombok and Sumbawa Islands in West Nusa Tenggara remains a major development issue requiring integrated and collaborative approaches. This study analyzes equitable development strategies by combining Implementation Theory with the Pentahelix Collaboration framework. Using a qualitative case study, the research involved 25 purposively selected stakeholders representing government, private sector, academia, community, and media. Data were gathered through in-depth interviews, field observations, and document review, then analyzed thematically using NVivo 12 Plus, supported by Four Quadrant Analysis and Implementation Theory. The findings reveal that disparities arise from uneven infrastructure development, the concentration of tourism and services in Lombok, and Sumbawa's reliance on mining despite its broader agricultural and forestry potential. Four strategic dimensions emerged: establishing coherence through a shared equitable vision, encouraging cognitive participation via inclusive multi-stakeholder involvement, strengthening collective action in optimizing natural resources and cultural assets, and enhancing reflective monitoring through participatory evaluation mechanisms. The study concludes that achieving equitable development in West Nusa Tenggara requires not only economic growth but also fair benefit distribution, improved regional connectivity, and inclusive governance. Scientifically, the research demonstrates the relevance of Implementation Theory for regional planning and highlights the need for adaptive, evidence-based policies grounded in local culture and collaborative partnerships.

Keywords: implementation theory, equitable development, pentahelix collaboration

INTRODUCTION

Equitable development is one of the fundamental principles in sustainable regional planning, as inequalities between regions can lead to social, economic and political problems (Atira et al., 2024). Globally, equitable development across regions contributes to inclusive economic growth, poverty reduction and improved quality of life (Salafin et al., 2024). In the context of islands, the challenges of equitable development are often related to differences in natural resources, accessibility, and infrastructure distribution (Setyaningtyas & Ayuningtyas, 2025). West Nusa Tenggara as an archipelago province consisting of Lombok Island and Sumbawa Island is a clear example of this complexity (Djunarsjah & Putra, 2021).

Theoretically, equitable development can be analyzed through the Implementation Theory approach, which emphasizes the relationship between strategy, implementation process, and policy outcomes (Nadia, 2022). In this framework, the success of equity is determined by four main variables, namely Coherence, Cognitive Participation, Collective Action, and Reflective Monitoring (Hafidz et al., 2023). In addition, the Pentahelix Collaboration model involveng the government, private sector, community, academia and media is seen as an effective collaborative mechanism to achieve equitable development goals (Hazin et al., 2024). The integration of these two concepts can result in inclusive and evidence-based development planning (Tadung, 2023).

Structural inequality between Lombok Island and Sumbawa Island in West Nusa Tenggara Province is evident, with economic growth and infrastructure development focused on Lombok, while Sumbawa remains underdeveloped and dependent on traditional agriculture and mining (Rahayu, 2023). The concentration of development in Lombok is supported by much better education, health, transportation and tourism infrastructure compared to Sumbawa, which still faces limited road access, health facilities and educational resources (Rahayu, 2023). In addition, unequal population distribution - with around 70% of West Nusa Tenggara's population living in Lombok despite Sumbawa's larger area - exacerbates inequalities in the provision of public services and infrastructure (Rahayu, 2023). The domination of policy by the Lombok elite and weak cross-island connectivity are also factors that deepen the gap between the two islands (Rahayu, 2023). Previous studies generally only highlight disparities based on macroeconomic indicators, such as income differences and access to basic services, without examining in depth the relationship between policy strategies and equity outcomes using the Implementation Theory approach (Yoda et al., 2007). Therefore, studies that integrate the analysis of policy strategies and equity outcomes within the framework of

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Implementation Theory are an important research gap to fill (Rahayu, 2023; Yoda et al., 2007).

Therefore, this research is important to explore more effective and sustainable development equity strategies in West Nusa Tenggara by integrating Implementation Theory and the Pentahelix Collaboration model. This research aims to map the condition of development inequality between Lombok Island and Sumbawa Island, analyze the strategies and equity policies that have been implemented, evaluate the implementation process, and identify the real impact on achieving equity. The results are expected to provide evidence-based policy recommendations that emphasize cross-sector collaboration, increase resource capacity, and optimize local potential so that equitable, inclusive, and sustainable development can be realized on both islands.

RESEARCH METHODS

Time and Location of Research

This research was conducted from March to June 2024 in West Nusa Tenggara Province, covering Lombok Island and Sumbawa Island. This location was chosen because it shows a significant phenomenon of development inequality, both in terms of geology, land cover, public facilities, and demographics, making it relevant to the research focus on equitable development Research Design

Population and Sample

The research population includes all stakeholders. The research population consists of two types of data sources, namely primary data and secondary data. Primary data was obtained from 25 respondents who were selected using purposive sampling technique, namely the selection of respondents based on direct involvement in the planning and implementation of development equity policies in West Nusa Tenggara Province. Respondents came from the local government, community, private sector, academia, and media (Etikan et al., 2016). Research variables for primary data include: (1) the level of development planning, (2) the level of collaboration between actors, (3) the results of policy implementation, and (4) the supporting and inhibiting factors of equitable development. Data were collected through semi-structured interviews, field observations, and document studies (local regulations, development reports, and media coverage). The research instruments were interview guides, observation sheets, and documentation tools.

Meanwhile, secondary data were obtained from official documents and publications related to geological conditions, climate, land cover, public facilities (health, education, and economy), night light maps, and demographic data of WEST NUSA TENGGARA Province until 2025. Secondary data samples were determined based on inclusion criteria, namely relevance to the research focus, clarity of sources, and within the 2019-2025 range. Research variables from secondary data include: (a) geological and landscape aspects, (b) land cover, (c) public facilities, and (d) population and demographic distribution. Search keywords included geology, land cover, health facilities, education, and demographics related to West Nusa Tenggara province. Media searches were conducted through official West Nusa Tenggara government documents such as the data were obtained from the Ministry of Environment and Forestry, Statistics Indonesia, the Ministry of Primary and Secondary Education, and the Department of Industry. as well as interpretation of BRIN satellite imagery.

Research Design

This research used a case study design with a qualitative approach. The main focus was on the analysis of geological conditions, climate, land cover, and public facilities covering the fields of education, health, and economy, coupled with the utilization of night light map data and demographic aspects of West Nusa Tenggara Province. This approach was chosen to gain a deeper understanding of development equity strategies, not only through analysis of official statistical data, but also by taking into account the perspectives of stakeholders who are directly involved in the process of planning and implementing development policies in the region.

Research Procedure

The research stages were carried out in stages by integrating primary and secondary data. The research steps are as follows:

1. *Literature study*
   The research began with a literature review on the theory of equitable development, Implementation Theory, and Pentahelix Collaboration as the conceptual basis of the research.
2. *Stakeholder identification and secondary data*
   Researchers identified actors involved in development planning and implementation in West Nusa Tenggara Province through coordination with the local government. At the same time, official government documents, statistical data, and regional development reports were collected as secondary data sources.
3. *Data collection*
   Primary data was collected through in-depth interviews with 25 selected respondents, field observations at strategic points that reflect development inequality, and policy document studies. Secondary data was obtained from official government documents data were obtained from the Ministry of Environment and Forestry, Statistics Indonesia, the Ministry of Primary and Secondary Education, and the Department of Industry. as well as interpretation of BRIN satellite imagery.
4. *Data selection and classification*
   Secondary data were selected based on inclusion criteria (relevance, clarity of source, and 2019-2025 period), then grouped into the themes of geology, land cover, public facilities, and demography.
5. *Data verification*
   Data validity was enhanced through triangulation of sources and methods, comparing the results of interviews, observations, and secondary documents.
6. *Analysis of equalization strategy*

Data Analysis

Data analysis in this study was conducted through the Four Quadrant Analysis approach and Implementation Theory. Four Quadrant Analysis was used to map the position of development strategies based on two main dimensions, namely the level of planning and the level of collaboration between actors. This approach allows researchers to identify the extent to which development strategies in West Nusa Tenggara are in the planned collaboration, planned

collaboration, and planned collaboration categories.

Furthermore, the Implementation Theory framework (May & Finch, 2009) is applied to examine the linkages between the strategy, implementation process, and outcomes of equitable development. In this theory, there are four key variables, namely Coherence, Cognitive Participation, Collective Action, and Reflective Monitoring, which serve as benchmarks for successful policy implementation. The analysis focuses on how these four variables are reflected in development policies and practices on Lombok Island and Sumbawa Island.

Qualitative data obtained from interviews, observations, and document studies were analyzed using thematic coding techniques with the help of NVivo 12 Plus software. The coding process was carried out in three stages, namely open coding to identify initial themes, axial coding to connect between themes, and selective coding to formulate main categories that represent equitable development strategies. Data validity was strengthened through source and method triangulation techniques, namely by comparing interview results with official document data and field observation results.

The results of the analysis were then presented in the form of tables, diagrams and descriptive-analytical narratives. This presentation aims to provide a comprehensive picture of development inequality between Lombok and Sumbawa, while emphasizing the potential for collaborative strategies that can support the realization of more equitable and sustainable development.

RESULTS AND DISCUSSION

Geology, Topography, and Ecoregions of West Nusa Tenggara

West Nusa Tenggara Province is located at the confluence of the Indian-Australian and Eurasian Plates, making it very active tectonically and volcanically. The presence of Mount Rinjani, Tambora, and Sangeangapi produces fertile soil as well as disaster risk. This geological condition is illustrated in Figure 1. Geological Condition Map of West Nusa Tenggara Province (SEA, 2024) which shows the distribution of volcanoes, volcanic structures, and major landforms. West Nusa Tenggara's topography is dominated by steep slopes (15-40%) covering 805,244 Ha or 36.45% of the total area. Lombok is relatively more gentle, making it suitable for wetlands and settlements, while Sumbawa is dominated by steep slopes suitable for drylands and forestry.

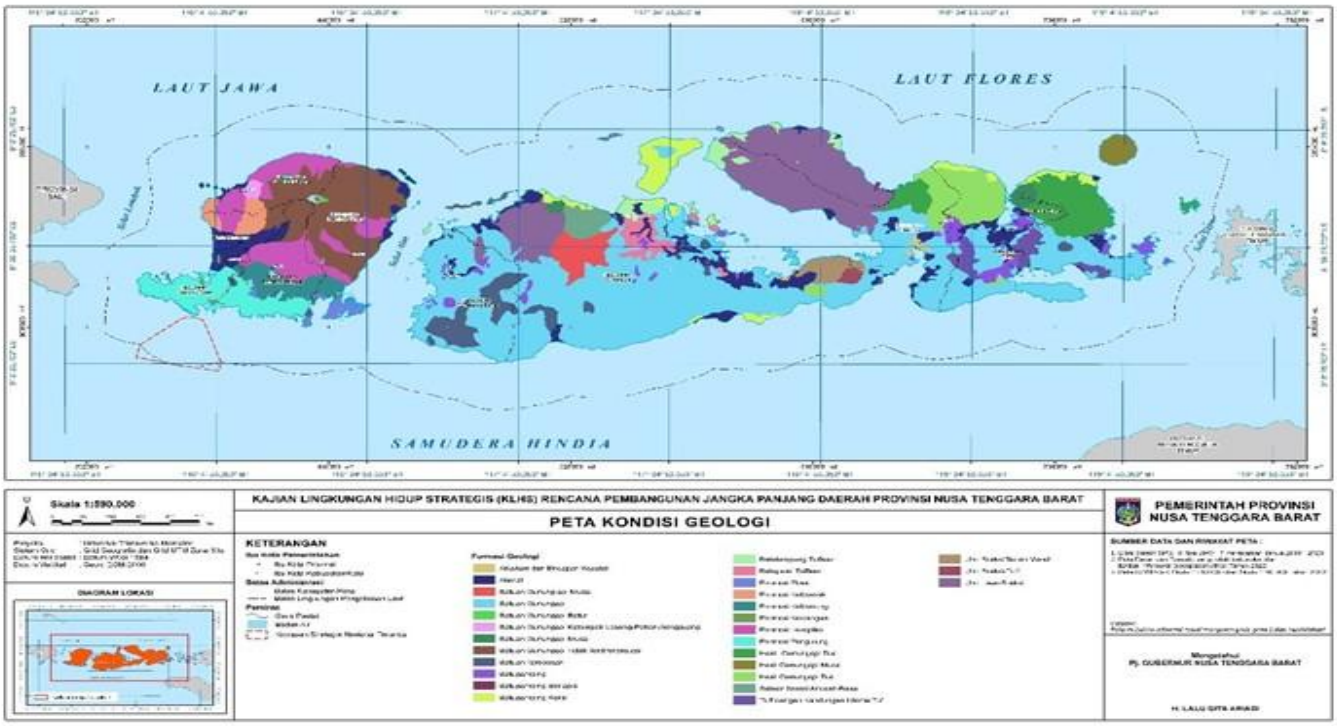

Figure 1. Geological Map of West Nusa Tenggara

The diversity of ecosystems is reflected in Table 1. Landscape Characteristics of Ecoregions of West Nusa Tenggara Province (KepmenLHK, 2021) with a total area of 7.54 million hectares. The largest ecoregions are volcanic mountains (2.03 million Ha), structural mountains (1.93 million Ha), and denudational mountains (0.85 million Ha). This variation shows great potential for agriculture, forestry, tourism and conservation. West Nusa Tenggara's climate is dry with a short rainy season. Temperatures range from 20.8-32.1°C, with the highest rainfall only 421-526 mm in December-January, while other months are often below 100 mm. These conditions make Lombok more favorable for wetland agriculture, while Sumbawa is suitable for dryland agriculture and fisheries.Overall, the results confirm that the geological, topographical and climatic conditions depicted in Figure 1 and Table 1 are the main factors differentiating development in Lombok and Sumbawa, so that equity policies must be based on the biophysical potential of each island.

Based on landscap data, West Nusa Tenggara is dominated by mountainous and hilly landforms with the largest area in the volcanic mountain category reaching 2,036,312.34 hectares. Structural and denudational mountains

also occupy a significant portion of the area, showing an undulating and complex topographic character. Meanwhile, fluvial and coastal plains have a relatively small area compared to mountainous landforms. Data on the West Nusa Tenggara region regarding the area of each landscape type canbe seen in Table 1.

Table 1. Landscape Characteristics of West Nusa Tenggara

Landscape	Area (Ha)
Lake	6,809.36
Fluvial Plain	367,492.64
Organic/Coral Plains	421,637.38
Coastal Plain	6,541.64
Volcanic Plains	95,380.50
Denudational Mountains	853,917.59
Structural Mountains	1,930,447.23
Volcanic Mountains	2,036,312.34
Denudational Hills	495,658.51
Karst Hills	365,740.37
Structural Hills	432,854.42
Volcanic Hills	527,802.06
Grand Total	**7,540,594.03**

Collective Action (Resource Leveraging and Cultural Embeddedness)

Equitable development between Lombok Island and Sumbawa Island in West Nusa Tenggara is strongly influenced by resource leveraging and cultural embeddedness. Resource leveraging is closely related to the utilization of natural resources and the budget allocation of the West Nusa Tenggara Provincial Government. As shown in Figure 5, land cover in this region shows the dominance of forests on Sumbawa Island, while built-up land is more concentrated on Lombok Island. This condition is further emphasized by the detailed land cover data presented in Table 1.

Based on Table 2, West Nusa Tenggara Province has a land area of 1,966,639 hectares with a land cover composition that shows significant differences between Lombok Island and Sumbawa Island. Forest land dominates at 47.18% or 927,825 hectares, mostly located on Sumbawa Island, while developed land only reaches 1.13% or 22,158 hectares and is concentrated on Lombok Island.

Table 2. Land Cover in West Nusa Tenggara

Land Cover	Area (Ha)	%
Forest	927.825	47,18
Grassland	61.452	3,12
Natural/Semi-Natural Open Land	27.444	1,4
Cultivated Open Land	2.940	0,15
Plantation/Garden	51.543	2,62
Wetland Agriculture	301.499	15,33
Dryland Agriculture	348.470	17,72
Bushland	159.531	8,11
Built-up Land	22.158	1,13
Water Body	63.774	3,24
Total	**1.966.639**	**100**

**Source: RTRW of West Nusa Tenggara Province Year 2025-2044*

This condition is also illustrated in Figure 5, which shows the dominance of forested areas in Sumbawa compared to the more rapid development of built-up areas in Lombok. In addition, the agricultural sector plays an important role with a contribution of 17.72% dry land and 15.33% wet land, indicating that agriculture is still the main backbone of the economy of the people of West Nusa Tenggara.

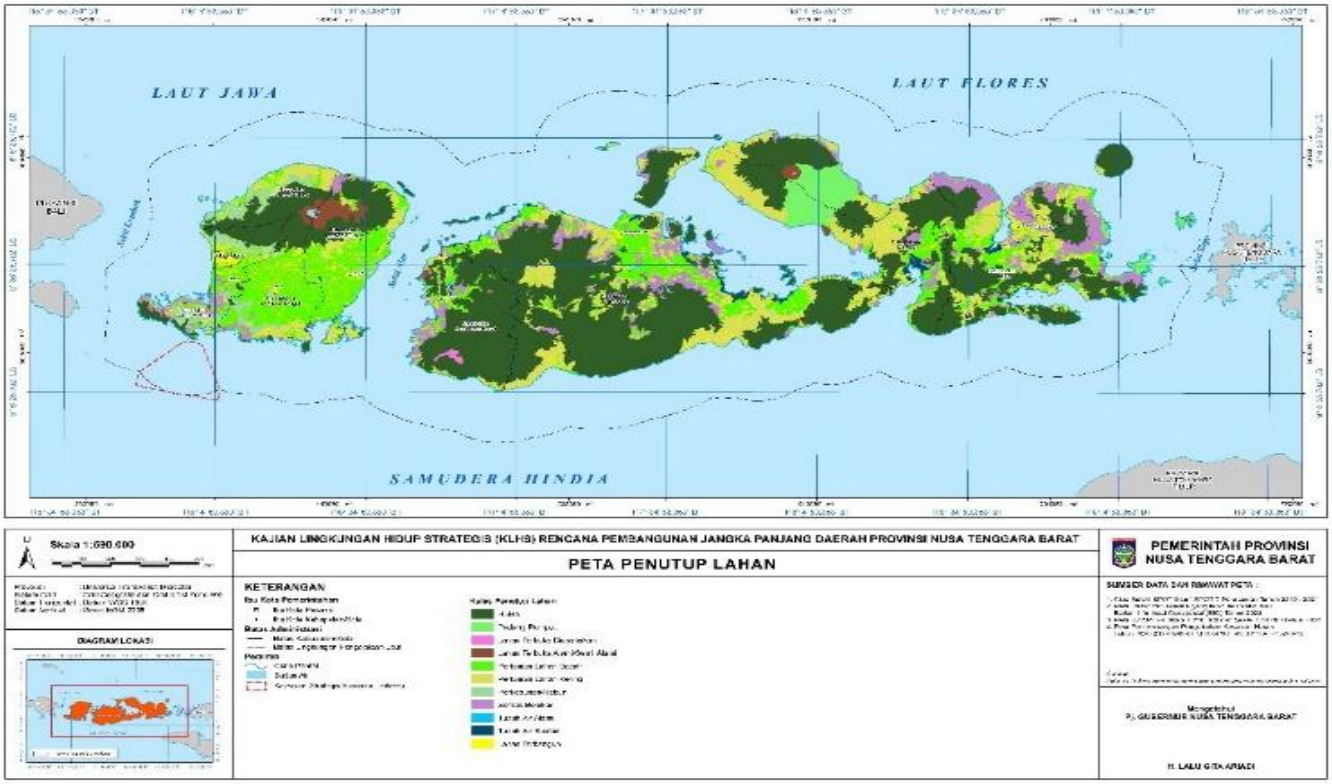

Figure 2. Land cover map

The disparity in land cover between Lombok and Sumbawa reflects the different character of development on the two islands. Lombok shows rapid development with the dominance of the manufacturing industry, construction, and tourism sectors, supported by more advanced infrastructure and high population density. This can be seen from the many

basic economic sectors in Lombok, such as the processing industry and construction, which contribute significantly to the regional economy despite their relatively low sectoral competitiveness (Umniyah et al., 2024; Rahayu, 2023).

In contrast, Sumbawa has great ecological potential through the vast area of forest and agricultural land, but the utilization of natural resources on this island is still stagnant and not optimal. Sumbawa's main sectors are mining and agriculture, with large economic contributions and high competitiveness, but infrastructure, public services and accessibility still lag behind Lombok (Umniyah et al., 2024; Rahayu, 2023). In addition, the unequal distribution of the population has led to more focused development of infrastructure and public services in Lombok, widening the gap between the two islands (Rahayu, 2023). To address this inequality, optimizing the utilization of Sumbawa's natural resources through community-based approaches, such as the development of agroforestry, non-timber forest products, and sustainable agriculture, is needed so that economic benefits can be felt more widely and not only depend on the mining sector (Umniyah et al., 2024).

The concept of cultural embeddedness is crucial in supporting natural resource utilization strategies, as development practices cannot be separated from the social and cultural structures of local communities. In West Nusa Tenggara, which consists of three major ethnic groups Sasak, Samawa and Mbojo, traditional knowledge and customary norms inherent to the community need to be integrated into development policies. This integration is important because social legitimacy and acceptance of local communities are key factors for successful program implementation at the site level (Laud et al., 2015; Wu & Pullman, 2015). Research shows that recognizing local cultural values and identities can increase community participation and willingness to protect and sustainably manage natural resources (Hoyos et al., 2009; Elwell et al., 2020). Participatory approaches, such as community forestry or community-based conservation models, have proven effective in improving ecological sustainability while providing economic benefits to local communities, especially if traditional knowledge and practices are accommodated in program planning and implementation (Wehi & Lord, 2017; Mehta et al., 2025). Thus, the integration of cultural aspects and community participation is a strategic instrument to ensure the success and sustainability of natural resource utilization in West Nusa Tenggara..

The utilization of natural resource potential in Sumbawa will not be optimal without adequate infrastructure support. The infrastructure gap, especially in the transportation sector between Lombok and Sumbawa, is one of the main factors hindering economic distribution and efficient resource utilization (Hidayat et al., 2024). Studies show that high-quality infrastructure plays an important role in improving production efficiency, facilitating the distribution of goods, and lowering logistics costs, thereby promoting regional economic growth (Hidayat et al., 2024). In addition, well-targeted infrastructure investment can reduce economic disparities between regions and strengthen regional competitiveness (Hidayat et al., 2024). However, without supporting infrastructure, natural resource wealth will not be able to provide long-term prosperity, as the results of resource exploitation should be converted into productive assets such as sustainable public infrastructure (Hidayat et al., 2024). Therefore, collective action in the context of resource leveraging in West Nusa Tenggara should focus on improving accessibility and connectivity, both across Lombok-Sumbawa Island and within Sumbawa itself, so that the economic benefits of natural resources can be optimized in an inclusive and sustainable manner (Hidayat et al., 2024). Overall, the land cover data in Figure 5 and Table 1 show that the potential of natural resources in West Nusa Tenggara, especially in Sumbawa, is huge but has not been optimized in an equitable manner. Through a collective action strategy that combines resource leveraging with cultural embeddedness, development can be directed at community-based resource management, improving connectivity infrastructure, and integrating local cultural values in the development process. This approach is expected to encourage a more inclusive and equitable economic transformation between Lombok Island and Sumbawa Island.

Public Facilities in West Nusa Tenggara

The distribution of health facilities in West Nusa Tenggara Province shows a significant difference between Lombok Island and Sumbawa Island. Lombok Island has the highest proportion of health facilities, amounting to 71% of the total facilities in West Nusa Tenggara. These facilities include 27 general hospitals, 7 special hospitals, 87 inpatient puskesmas, 16 non-inpatient puskesmas, 177 private clinics, and 5,506 posyandu. Meanwhile, Sumbawa Island has only 29% of the total health facilities, with details of 12 general hospitals, 66 inpatient puskesmas, 8 non-inpatient puskesmas, 41 private clinics, and 2,288 posyandu. The distribution of health facilities in West Nusa Tenggara can be seen in Figure 3.

Based on Table 3, East Lombok Regency has the highest number of health facilities with a percentage of 25%, followed by Central Lombok Regency with 22%. West Sumbawa Regency and Bima City have the least number of health facilities, at 3% and 2% respectively. Mataram City has the highest number of hospitals, with 16 units consisting of 12 general hospitals and 4 specialized hospitals. Overall, West Nusa Tenggara has 39 general hospitals, 7 special hospitals, 153 inpatient puskesmas, 24 non-inpatient puskesmas, 218 private clinics, and 7,794 posyandu. Educational facilities in West Nusa Tenggara Province are distributed across all regencies and cities, with varying numbers at each educational level.

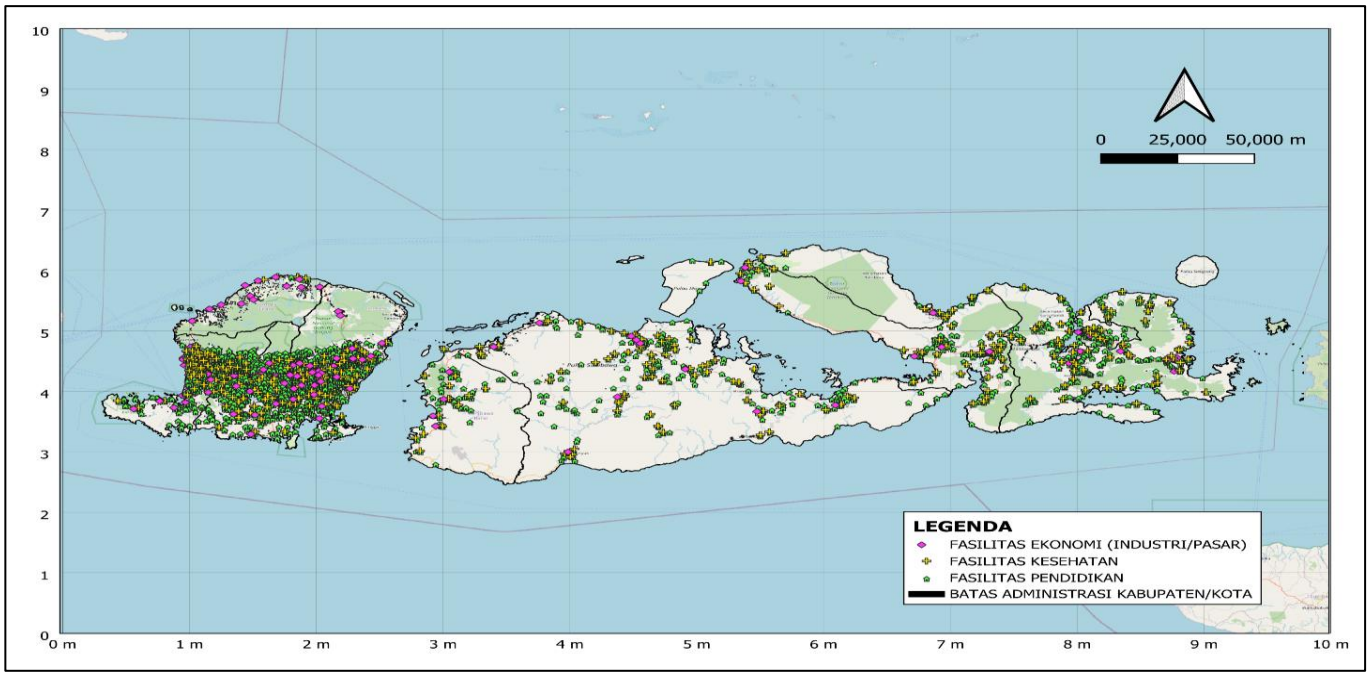

Figure 3. Distribution of Health Facilities in West Nusa

Overall, West Nusa Tenggara has 2,992 early childhood education institutions (kindergartens or equivalent), 4,272 elementary schools (or equivalent), 2,077 junior high schools (or equivalent), 1,017 senior high schools (or equivalent), 360 vocational high schools (or equivalent), and 53 special education schools. The largest number of educational facilities is found in East Lombok Regency, accounting for 26% of the total in West Nusa Tenggara. This regency has 778 kindergartens, 1,032 elementary schools, 564 junior high schools, 269 senior high schools, 104 vocational schools, and 8 special education schools.

Table 3. Number of Educational Facilities in West Nusa Tenggara

Regency/City	Kindergarten	Elementary School	Junior High School	Senior High School	Vocational High School	Special School	Percentage
West Lombok	238	485	245	131	46	3	11%
Central Lombok	635	944	526	281	79	5	23%
East Lombok	778	1032	564	269	104	8	26%
North Lombok	144	202	102	43	14	3	5%
Mataram City	202	206	78	52	20	4	5%
Sumbawa	249	407	148	47	22	3	8%
Dompu	111	286	127	56	24	9	6%
Bima	407	495	194	92	33	12	11%
West Sumbawa	116	123	54	19	7	1	3%
Bima City	112	92	39	27	11	5	3%
Lombok Island	1997	2869	1515	776	263	23	69%
Sumbawa Island	995	1403	562	241	97	30	31%
West Nusa Tenggara	**2992**	**4272**	**2077**	**1017**	**360**	**53**	**100%**

**Source: Processed by Researchers Based on Ministry of Education and Culture Data, 2025*

Central Lombok Regency ranks second with 23%, while West Lombok and Bima Regencies each account for 11%. The regencies with the fewest educational facilities are West Sumbawa and Bima City, each representing 3%. Mataram City, as the provincial capital, has a considerable number of educational facilities, particularly at the kindergarten and elementary school levels. Based on regional distribution, Lombok Island dominates with 69% of the total educational facilities in West Nusa Tenggara. In contrast, Sumbawa Island accounts for only 31% of the total. This indicates that the distribution of educational facilities in West Nusa Tenggara remains concentrated on Lombok Island. The higher number of educational institutions on Lombok Island reflects its greater population density and educational activity compared to Sumbawa Island.

The number of educational facilities in West Nusa Tenggara can be seen in Table 4. The distribution of economic facilities in West Nusa Tenggara Province shows that Lombok Island has more industries and markets than Sumbawa Island, accounting for 60% of the total (Table 5). Mataram City is the region with the highest contribution to economic facilities with 123 industries and 17 markets or 19% of the total province. The second position is occupied by Bima City with 113 industries and 4 markets, contributing 16%. Central Lombok District also has a sizable number of economic facilities, with 41 industries and 56 markets, accounting for 13%.

Table 4. Land Cover in West Nusa Tenggara

District/City	Industri	Pasar	Persentase
West Lombok	15	32	6%
Central Lombok	41	56	13%
East Lombok	22	43	9%
North Lombok	85	14	13%
Mataram City	123	17	19%
Sumbawa	18	11	4%
Dompu	11	11	3%
Bima	24	20	6%
West Sumbawa	77	6	11%
Bima City	113	4	16%
Lombok Island	286	162	60%
Sumbawa Island	243	52	40%
West Nusa Tenggara	**529**	**214**	**743**

Source: RTRW of West Nusa Tenggara Province Year 2025-2044

Based on Table 1, West Nusa Tenggara Province has a land Meanwhile, West Sumbawa Regency has 77 industries and 6 markets with a contribution of 11%, followed by North Lombok which has 85 industries and 14 markets with the same percentage of 13%. The district with the least number of economic facilities is Dompu, which only has 11 industries and 11 markets or around 3%. In general, the distribution of industries in West Nusa Tenggara is more dominant in urban and coastal areas, such as Mataram City and Bima City, compared to inland areas. Overall, West Nusa Tenggara has 529 industrial units and 214 markets spread across districts and cities, reflecting the growing economic potential of the region.

Population Density in West Nusa Tenggara

The total population of West Nusa Tenggara Province reached 5,619,450 people, consisting of 2,802,761 men and 2,816,689 women. In general, the sex ratio of the population of West Nusa Tenggara is relatively balanced between men and women. East Lombok Regency has the highest population, with 1,412,321 people or 25% of the total population of West Nusa Tenggara. Central Lombok Regency is in second place with 1,099,211 people or 20% of the total population. West Lombok Regency is in third place with a population of 742,815 or 13%. Population density in West Nusa Tenggara can be seen in Table 5.

Table 5. Population Density in West Nusa Tenggara

District/City	Population Density	Gender		Total	Persentase
		Male	Female		
West Lombok	797	80.311	81.266	161.577	3%
Central Lombok	7428	227.627	229.622	457.249	8%
East Lombok	327	133.239	132.261	265.500	5%
North Lombok	91	75.579	75.377	150.956	3%
Mataram City	131	269.772	268.671	538.443	10%
Sumbawa	112	133.943	133.492	267.435	5%
Dompu	82	262.049	261.894	523.943	9%
Bima	894	703.528	708.793	1.412.321	25%
West Sumbawa	966	545.905	553.306	1.099.211	20%
Bima City	841	370.808	372.007	742.815	13%
Lombok Island		1.981.107	1.995.989	3.977.096	71%
Sumbawa Island		821.654	820.700	1.642.354	29%
West Nusa Tenggara		**2.802.761**	**2.816.689**	**5.619.450**	**100%**

**Source: Processed by the Author Based on BPS Data, 2025*

Meanwhile, the smallest population is found in Kabupaten Sumbawa Barat, at 150,956 people or 3% of the total population. Mataram City has the highest population density, reaching 7,428 people per square kilometer, because it is the center of the provincial government and economy. In contrast, Sumbawa Regency has the lowest population density with only 82 people per square kilometer. When viewed by regional division, Lombok Island holds 71% of the total population of West Nusa Tenggara, while Sumbawa Island is only 29%. This condition shows that the distribution of population in West Nusa Tenggara is still uneven and tends to be concentrated on Lombok Island, especially in urban areas such as Mataram City and East Lombok Regency. The population density in West Nusa Tenggara has increased significantly from 2016 to 2024. This increase can be seen from the distribution of malay lights seen through satellites in Figure 4.

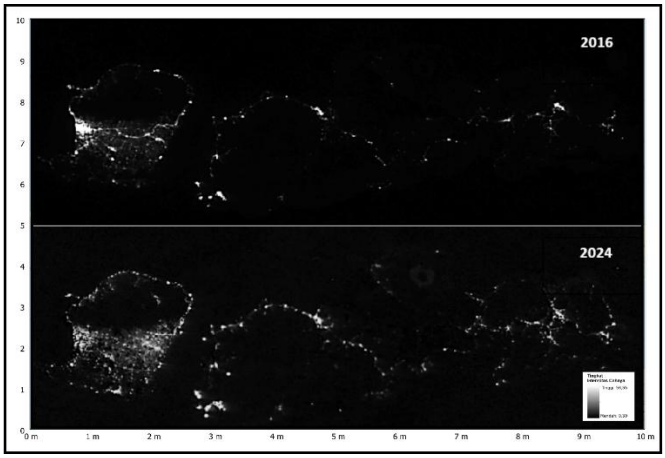

Figure 4. Comparison Map of Night Light West Nusa Tenggara from 2016-2024

**Source: Author's Processing Based on GEE Satellite Imagery,2025*

Cognitive Participation (*Pentahelix Collaboration)*

Cognitive participation in the context of equitable development in West Nusa Tenggara refers to the active involvement of various actors who support each other in the planning process to policy implementation. As shown in Table 2, the Pentahelix Collaboration model involves five main elements, namely the government, private sector, community, academia, and media, where each has a strategic role that complements each other. The government acts as a policy maker, the private sector contributes financial support through CSR funds, the community functions as an aspirant as well as social control, academia provides technocratic studies, while the media becomes a channel of information and conveys public aspirations. The collaboration of these five elements is an important foundation to ensure that development equity policies in West Nusa Tenggara are inclusive, participatory and sustainable.

Cognitive Participation in the Normalization Process Theory (NPT) framework emphasizes "relational work" to build and maintain a community of practice around a collaborative initiative. In the context of pentahelix collaboration (government-business-academia-community-media), this lens helps to read whether the actors in Table 2 are actually enrolled, feel their roles are legitimate, and continue to activate collaborative practices after initiation. The four key sub-components of initiation, enrolment, legitimation and activation provide concrete checkpoints: who are the initial movers, how is the network recruited, what is the basis for legitimacy (regulation, budget, social mandate), and how is the practice sustained (joint working mechanisms, SOPs and measurable targets). This approach is well-established in the implementation literature and has proven useful for assessing the success of cross-actor collaboration, making it relevant to interpret the role structure in Table 7. and orchestrator, providing a regulatory framework, funding, and coordination forums that invite the participation of other actors from the initiation to activation stage. Evidence from the pentahelix collaboration case study in North Lombok shows that when the local government facilitates a common platform (e.g. disaster resilience forum), enrolment of communities, businesses, academics and media increases, program legitimacy strengthens and collective action becomes sustainable. This confirms that formal mandates and government budget support trigger inter-actor "shared commitment", a core prerequisite of cognitive participation.

Table 6. Aktor and Roles in Pentahelix Colaboration

Aktor	Roles
Government	Pembuat Kebijakan
Private Sector	Dana CSR
Community	Aspirasi dan Kontrol
Academy	Kajian Teknokratis
Media	Media Aspirasi

Findings on the development of agro-culture-based edu-tourism in the buffer zone of TNBTS show that the role of the campus in program design, mentoring, and knowledge transfer accelerates community enrolment and provides a scientific basis for local policy legitimacy; when this evidence-based model works, activation appears in the shared SOP, training curriculum, and periodic evaluation cycles that keep collaboration alive. This confirms the importance of a continuous learning loop within the pentahelix so that practices do not stop at short-term projects.

The role of business in Table 7 is typically as an investor, value chain integrator and market incentivizer. Evidence from collaborative governance studies in policy journals shows that when the business sector is included from the co-design stage - not just as a CSR donor - value-based legitimation is achieved: other actors see direct business contributions to shared value creation (e.g. market access, quality standardization, and service innovation). Activation is then seen in partnership contracts, blended financing schemes, and cross-actor performance targets that are jointly evaluated.

The communities listed in Table 7 are both co-creators and stewards of sustainability. The Indonesian case literature shows that pentahelix collaboration is most stable when communities are involved from the outset to map out roles, rights and benefits; this meaningful participation strengthens social legitimacy and makes activation less dependent on individual figures or ephemeral projects. The media, at the same time, acts as a transparency booster and amplifier of shared narratives: regular coverage, public campaigns, and citizen feedback broaden enrolment and maintain accountability so that collaborative practices stay on-track. Pentahelix studies in tourism, public services and disaster preparedness document this pattern repeatedly.

Based on this evidence, reading Table 7 through the lens of cognitive participation encourages sharpening collaboration governance: (i) clarify initiation through formal mandates, stakeholder maps, and champion designations for each element of the pentahelix; (ii) accelerate enrolment with joint working agreements, regular meeting schedules, and aligned incentives; (iii) strengthen legitimation through derivative regulations, cross-OPD budget allocations, and performance standards recognized by all actors; (iv) secure activation through integrated work plans, collaborative performance indicators, and media-mediated public feedback cycles. This framework is consistent with cross-sector NPT evidence that collaboration becomes embedded when relational work between actors is proven, legitimized, and continuously activated through shared rules and evaluation.

Coherence (Equitable Vision)

Coherence or vision of equitable development in West Nusa Tenggara Province can be analyzed through the structure of Gross Regional Domestic Product (GRDP) presented in Table 7. The data shows that the agriculture, forestry and fisheries sectors are the largest contributors to West Nusa Tenggara's GRDP, followed by the mining and construction sectors. The high dependence on mining, especially in Sumbawa Island, is inversely proportional to the dominance of infrastructure development, tourism and services concentrated on Lombok Island. This condition shows the disparity in development orientation between islands, so that a common vision of equitable development is needed that does not only focus on sectoral economic growth, but also on equitable distribution of benefits between regions.

The vision of coherent and equitable development in West Nusa Tenggara Province can be analyzed through the structure of the Gross Regional Domestic Product (GRDP) in 2024, which shows that the agriculture, forestry and fisheries sectors are the largest contributors to GRDP, followed by the mining, construction and trade sectors. This data confirms that West Nusa Tenggara economic base is still heavily dependent

on the primary sector, with agriculture dominating in Lombok and mining in Sumbawa (Pramaria, 2023). However, the dominance of the mining sector in Sumbawa has not directly improved the welfare of local communities, as public infrastructure and services are still more concentrated on Lombok Island (Hipziwaty et al., 2019; Made et al., 2025). This imbalance is reflected in the unequal distribution of development benefits between regions, where economic growth and increases in GRDP have not fully impacted poverty reduction and welfare improvement across West Nusa Tenggara (Karimah et al., 2024; Ali et al., 2024; Hipziwaty et al., 2019). Research also shows that despite increasing GRDP and economic growth, income disparity and regional inequality remain key challenges in realizing equitable and inclusive development in West Nusa Tenggara (Hipziwaty et al., 2019; Made et al., 2025). Thus, the current sectoral contribution of GRDP does not yet fully reflect the equitable distribution of development benefits among regions in West Nusa Tenggara.

Table 7. Gross Regional Domestic Product (GRDP) at Constant Prices of West Nusa Tenggara 2024

Gross Regional Domestic Product (GRDP) at Constant Prices 2024.	**Area (Ha)**
Agriculture, Forestry, and Fishing	22992,21
Mining and Quarrying	20342,79
Manufacturing	4839,21
Electricity and Gas Water Supply; Sewerage	129,45
Waste Management, and Remediation Activities	81,03
Construction	10884,96
Wholesale and Retail Trade;Repair of Motor Vehicles and Motorcycles	15603,08
Transportation and Storage	6090,24
Accommodation and Food Service Activities	1686,3
Information and Communication	3145,87
Financial and Insurance Activities	4037,08
Real Estate Activities	3398,75
Business Activities	206,13
Public Administration and Defence; Compulsory Social Security	5576,67
Education	5256,24
Human Health and Social Work Activities	2540,69
Other Services Activities	2604,26
Total PDRB	**109414,97**

**Source: Central Bureau of Statistics, 2025*

The vision of coherent and equitable development in West Nusa Tenggara Province can be analyzed through the structure of the Gross Regional Domestic Product (GRDP) in 2024, which shows that the agriculture, forestry and fisheries sectors are the largest contributors to GRDP, followed by the mining, construction and trade sectors. This data confirms that WEST NUSA TENGGARA's economic base is still heavily dependent on the primary sector, with agriculture dominating in Lombok and mining in Sumbawa (Pramaria, 2023). However, the dominance of the mining sector in Sumbawa has not directly improved the welfare of local communities, as public infrastructure and services are still more concentrated on Lombok Island (Hipziwaty et al., 2019; Made et al., 2025). This imbalance is reflected in the unequal distribution of development benefits between regions, where economic growth and increases in GRDP have not fully impacted poverty reduction and welfare improvement across West Nusa Tenggara (Karimah et al., 2024; Ali et al., 2024; Hipziwaty et al., 2019). Research also shows that despite increasing GRDP and economic growth, income disparity and regional inequality remain key challenges in realizing equitable and inclusive development in West Nusa Tenggara (Hipziwaty et al., 2019; Made et al., 2025). Thus, the current sectoral contribution of GRDP does not yet fully reflect the equitable distribution of development benefits among regions in West Nusa Tenggara.

Within the framework of an equitable development vision, equitable development in West Nusa Tenggara emphasizes not only sectoral economic growth, but also the fair distribution of development benefits to all communities in various regions. Effective development planning should optimize the utilization of human, financial, and physical resources to improve people's welfare in an inclusive and sustainable manner, as emphasized by Todaro and Smith (2019). Therefore, West Nusa Tenggara needs a development vision that is able to unite interests between regions-not only prioritizing Lombok's economic growth based on tourism and services, but also encouraging Sumbawa's economic transformation through strengthening competitive agriculture, forestry and fisheries sectors.

Research shows that economic disparities between regions in Indonesia are often triggered by infrastructure inequality and investment concentration in certain regions. Sukwika (2018) found that centralized infrastructure development increases GRDP inequality, reflected by the Williamson Index value of 0.7, which indicates the concentration of growth in the central region. A similar issue was also identified by Hafidz et al. (2023), which emphasizes the importance of collaboration between development actors with a shared vision so that development results are not biased towards certain regions (Hafidz et al., 2023). In the context of West Nusa Tenggara, the vision of equity must be able to integrate Sumbawa's sectoral potential with the strengthening of infrastructure and public services, so that the high GRDP contribution from the mining and agriculture sectors really has an impact on improving the quality of life of people throughout the region.

Coherent development in West Nusa Tenggara requires a forum for cross-actor dialogue and collaboration that emphasizes understanding of long-term policy directions. The concept of collaborative planning emphasized by Healey highlights the importance of dialogic and consensus processes in planning, so that sustainable and equitable development goals can be achieved (Healey, 2003). This approach is particularly relevant for West Nusa Tenggara, given that the different economic structures between Lombok and Sumbawa require an integrated development vision that is not only oriented towards the growth of Gross Regional Domestic Product at Constant Prices, but also towards reducing spatial and sectoral disparities (Margerum, 2002; Booher & Innes, 2000). Collaborative planning has been proven to strengthen the capacity of local actors, build trust, and create a more inclusive space for participation in development decision-making (Knapp, 2017; Margerum, 2002; Booher & Innes, 2000).

Within the equitable vision framework, the development direction of West Nusa Tenggara needs to focus on three main aspects. First, optimizing the potential of the primary sector in Sumbawa, especially agriculture and forestry, through strengthening agro-industry. Second, economic diversification beyond the mining sector so that development is more sustainable and does not depend on one sector alone. Third, strengthening collaborative forums across sectors to ensure that the direction of development policies is understood and agreed upon by all stakeholders (Margerum, 2002; Booher & Innes, 2000; Healey, 2003). This approach is in line with inclusive development theory, which emphasizes the importance of participation, dialogue and collaboration in realizing equitable development between islands (Margerum, 2002; Healey, 2003).

Reflective Monitoring

Reflective monitoring in the context of equitable development in West Nusa Tenggara is a participatory and continuous evaluation process that involves communities, government, and stakeholders to reflect on the impact of development policies, identify inequalities, and adjust strategies dynamically. The concept is rooted in Anthony Giddens' Structuration Theory (1984), which emphasizes that social structures are formed and shape agents' actions through a process of critical reflection, thus enabling more equitable and inclusive social change (Edelist et al., 2024). This reflective approach is also in line with the practice of participatory evaluation, which emphasizes the importance of dialogue, collaboration and involvement of various actors to identify and address inequalities in development (Edelist et al., 2024; Guidrey et al., 2022).

Nationally, Indonesia has adopted various reflective monitoring efforts, one of which is through the Minister of Home Affairs Regulation No. 86/2017 which regulates the procedures for participatory regional development planning, control and evaluation. This mechanism is realized through public consultation forums and development planning deliberations (Musrenbang) in the preparation of planning documents such as RKPD, RPD, RPJMD, and RPJPD, which aim to ensure that the entire development planning process involves the community in an inclusive manner (Guidrey et al., 2022). The principles of equitable and participatory evaluation are also emphasized in the Equitable Evaluation Framework, which requires the active involvement of all stakeholders to ensure relevant and sustainable development outcomes (Guidrey et al., 2022).

The main challenge in the implementation of reflective monitoring in West Nusa Tenggara lies in the implementation of Musrenbang and the establishment of the APBD. Often, village community representatives who attend the Musrenbang are not fully able to convey the aspirations and needs of all the residents they represent, so that the real needs of the community are less accommodated. In addition, in the process of determining the APBD, political interests and budget constraints often cause the allocation of funds to prioritize the ideas of the DPRD over the results of the Musrenbang agreement, so that community aspirations that have been agreed upon in a participatory manner are often marginalized (Guidrey et al., 2022). These challenges demonstrate the importance of strengthening community capacity and transparency in decision-making processes so that reflective monitoring can truly promote equitable development.

Increasing the capacity of planners and bureaucracy, implementing e-government systems, and strengthening public oversight mechanisms are strategic steps in improving governance. The establishment of government internal control units (SPIP) and the strengthening of the Financial and Development Supervisory Agency (BPKP) at the regional level can improve the effectiveness of financial management and supervision of the implementation of development programs in the regions. In addition, data-based development and IoT systems continue to be developed, and currently the Government of the Republic of Indonesia uses the Local Government Information System (SIPD-RI) which is a planning and budgeting system in the Republic of Indonesia. SIPD continues to be refined because there are still various obstacles, especially servers that are down due to national use. In addition, the Ministry of Home Affairs as the coordinator of Local Government often issues directives that are not in line with other Ministries / Institutions so that in the planning process nationally to the regions there is a lack of synchronization, especially related to data and website systems.

West Nusa Tenggara in addition to various applications and innovations from the Central Government to optimize Reflection Monitoring built various program innovations such as SINOVIK, West Nusa Tenggara Open Data, West Nusa Tenggara Asri and Lestari, and 1000 Startup Movement. The four applications have shown significant results in contributing to equitable development in West Nusa Tenggara. First, there is SINOVIK (West Nusa Tenggara Inclusive Development Information System) as a form of citizen reporting system related to inequality via the SINOVIK application.

West Nusa Tenggara Open Data as a form of Government transparency application to see a comparison of development realization between districts / cities (proven effective in encouraging an increase in the infrastructure budget on Sumbawa Island by 25%). Then, West Nusa Tenggara Asri and Lestari as the focus of sustainable development to review the results of citizen monitoring of water quality via IoT sensors. And the West Nusa Tenggara 1000 Startup Youth Movement which monitors digital access; the recommendation is to form a Digital Hub in Bima which significantly shows a decrease in the gap in internet access from 35% to 15% but is still a challenge, namely the Digital Divide where as many as 60% of remote villages in Sumbawa do not have internet access, hampering participation. Reflective Monitoring in WEST NUSA TENGGARA is not yet optimal overall, but these various efforts are sufficient to reduce existing inequality, especially by utilizing information technology as a means of connecting every community.

CONCLUSION

This research shows that development inequality between Lombok Island and Sumbawa Island in West Nusa Tenggara Province is structural, triggered by the dominance of infrastructure, services, and tourism development in Lombok, while Sumbawa despite its large contribution from the mining, forestry, and agriculture sectors still faces limited accessibility and basic infrastructure. Analysis based on Implementation

Theory confirms that equitable development can only be achieved if the four key variables: Coherence, Cognitive Participation, Collective Action, and Reflective Monitoring can be integrated consistently in policy planning and implementation.

Practically, the strategy for equitable development in West Nusa Tenggara needs to be directed at optimizing Sumbawa's natural resource potential through collective action based on forest management and sustainable agriculture, accompanied by improved transportation infrastructure to reduce logistics costs. In terms of cultural embeddedness, the integration of local socio-cultural values must be used as a foundation in policy formulation so that development legitimacy can be accepted by the community. In terms of cognitive participation, the application of the Pentahelix Collaboration model is important to involve the government, private sector, academia, community and media in a balanced manner so that the direction of development is not dominated by one regional interest. Meanwhile, reflective monitoring must be strengthened through participatory and data-based evaluation mechanisms so that the policies implemented remain adaptive to the dynamic needs of the people on both islands.

Thus, equitable development in West Nusa Tenggara is not enough to focus only on economic growth, but must be based on a shared vision of justice, cross-sector collaboration, and participatory institutional strengthening. This approach is expected to encourage inclusive, equitable and sustainable development transformation for the people of Lombok and Sumbawa.

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